Editorial ......................................................... 3
RFP News ....................................................... 6

F. DUDENHÖFFER

Global automotive market 2016 – New challenges along the growth path ...................... 16

The automotive year 2016 promises growth for car manufacturers and suppliers. A new global sales record with almost 78 million new cars seems realistic. China, the USA and Europe will remain the key growth drivers, while South America and Eastern Europe will stay in recession. Global growth will be the pretty side of the coin. Less beneficial for profits is the sector are rising environmental requirements, which are also responses to the emissions scandal of the Volkswagen Group. In 2016 and subsequent years this will cause an increased burden through emission purification systems and investments in electromobility. Growth comes at a price.

N. VLEUGELS, W. PILLE-WOLF, W. K. DIERKES, J. W. M. NOORDERMEER

Influence of oligomeric resins on traction and rolling resistance of silica tire treads .................. 20

This study concerns the silica-reinforcement of synthetic rubber compounds for passenger tire treads with the objective to gain insight into the beneficial effects of oligomeric resins, derived from natural and synthetic monomers, on the major tire performance factors: rolling resistance and (wet) skid resistance. This manuscript highlights the relationship between the performances of various oligomeric resins in different concentrations (2, 4, and 6 phr) on the dynamic mechanical behavior of the silica reinforced passenger car tire tread compounds. Three types of resins were tested: a polyterpene, a terpene-phenolic, and a pure vinyl-aromatic hydrocarbon resin. Dynamic mechanical analysis (DMA) was used, in addition to Mooney viscosity, cure meter, tensile, and hardness tests to assess the behavior of these resins in the rubber and to characterize the processability of the compounds. The DMA shows that the resins and rubber compounds are compatible at the resin quantities used. The tan δ loss angle versus temperature was used as an indication for wet skid and rolling resistance. The shift to a higher temperature in the tan δ peak belonging to the glass transition (Tg) of the rubber phase, due to the contribution of the higher Tg of the resins, is the reason for improved wet skid performance. A maximum improvement of about 35 % in the wet skid region (0 – 30 °C) is found. The improved tan δ at 60 °C, indicative for rolling resistance, accounts for reduced interaction between filler particles. This is also confirmed by a decrease in Payne effect. A maximum improvement of about 15 % is found in the rolling resistance temperature range, dependent on the particular choice of the resin.

M. ZABEL

Continuous extrusion of tread profiles – Producing complex tire profiles in a single step using latest Troester CoEx aggregates ......................... 27

J. PAN, G. SOANE, K. SEE

Determination of PAHs in tires by GC/MS and NMR .................................................. 28

The ISO 21461 method uses nuclear magnetic resonance (NMR) spectrometer signals from the “Bay-H” of PAHs to specify whether tires meet the EU's PAH standards. However, few studies have been done to correlate the EU's original PAH standards and the ISO 21461 (NMR) method's 0.35 % rule. A standard procedure for extracting targeted PAHs from tire rubber was developed using experiments that tested the following: the PAH extraction efficiencies of 7 organic solvents, the effect of rubber bit size on PAH extraction efficiencies, the precision and accuracy of the developed method using custom-made rubber slabs, how comparable the data are between toluene and acetone extractions of the EU-regulated 8 PAHs on 3 custom-made rubber slabs using both the NMR and the developed GC/MS methods, how comparable GC/MS and NMR data are from 50 commercial tires made after 01/01/2010 extracted with toluene, and how comparable are GC/MS and NMR data from 12 EU-made tires extracted separately with toluene and acetone. The results indicate that toluene was the most efficient solvent for extracting PAHs from rubber, rubber bit size did not affect extraction efficiencies of 4- and 5-ring PAHs, the developed GC/MS method averaged 69 % accuracy and 8.3 %RSD (percent relative standard deviation) using Soxhlet extraction with toluene, GC/MS data reflected the projected PAH concentration for the 3 custom-made rubber slabs whereas the NMR data did not follow the expected trend. Most importantly, of the 50 tires tested, ISO 21461 (NMR) passed 82 % (41/50) of which 85 % (35/41) were considered as "false negatives" based on the GC/MS results. Of the 12 EU-made tires, 11 passed based on NMR results but only 4 passed based on "sum of 8 PAHs" and only 2 based on BaP (benzo(a)pyrene) concentration using the GC/MS method. On average, acetone extracts resulted in 14.1 % higher Bay-H% data, yet provided lower BaP and "sum of 8 PAHs" values (by 90.1 % and 60.5 %, respectively), the pass/fail results were identical to the toluene extracts. The ISO 21461 (NMR) method does not produce data proportionally reflecting the concentrations of BaP or "sum of 8 PAHs" in the tires. The PAH method presented here using GC/MS determines individual PAH levels in the tire extracts rather well. A good GC/MS method should be adopted as the official method for upholding the EU's original PAH standards for tires.

G. NJUUMAN

An active front spoiler system based on a rubber moulded article .................................... 36

The advantages of the application of front spoilers on passenger cars are well known. However, the possibilities in geometry for such front spoilers are limited for the car's every day usage. Collisions with garage ramps and speed bumps need to be avoided. In this article an active front spoiler is presented in which the spoiler lip is made of rubber and the activation is done by means of air bellows. This spoiler combines an excellent spoilering function by reducing the ground clearance with an unlimited everyday usage of the car, and is an example of a highly innovative system in which rubber plays an essential role.
B. SCHRITTESSER, G. PINTER, T. SCHWARZ, Z. KADÂR, T. NAGY

Impact of the acrylonitrile content on the mechanical performance of elastomeric materials .......... 40

Elastomeric materials used in the oil and gas industry are exposed to extreme operating conditions (different media, high temperature and pressure). Due to these harsh conditions only a handful of materials are applicable in this field. Especially hydrogenated acrylonitrile butadiene rubbers (HNBR) are characterised by excellent oil resistance and good ageing resistance. The tear and crack resistance depends on the acrylonitrile content and the backbone. In the present study the impact of the acrylonitrile content on basic mechanical properties, the tear resistance and the permeation behaviour of the elastomer will be evaluated. Particularly, the rapid gas decompression behaviour, the spontaneous failure of pressurised elastomeric parts during decompression, will be investigated. The performance of three different model elastomers with varying acrylonitrile content based on hydrogenated acrylonitrile rubbers was studied in detail. Besides the dynamic mechanical characterisation, the tear resistance was measured using dumbbell specimens. Furthermore, the test setup was equipped with a three dimensional optical surface strain measurement system in order to investigate not only the surface strain but also the crack growth behaviour of the different materials. Finally, these results were correlated with permeation measurements as well as rapid gas decompression tests to generate an understanding of the material's behaviour and to enable a targeted material development process.

T. GEBAUER, V. SCHWITTAY

Pressure prediction in elastomer molds ................................................................. 48

In spite of ongoing development of existing simulation models it happens that the simulation results do not always match the measurements taken at the actual machine. An erroneous simulated pressure in the elastomer mold may critically affect other simulation results such as the predicted filling behavior, the mechanical properties of the component, or warpage of the finished part, as correlations between pressure changes and related temperature development exist. Errors in the predicted values could lead to serious problems in the serial production. The article gives a brief introduction to the measurement and simulation of pressure and answers various questions.

From the “RadTech Europe Conference 2015“ in Prague ......................................... 50

Automatic stripping of core-moulded pipe seals .................................................... 51

F. KRČMA, L. KALINA, E. NEZBEDOVÁ, L. POSPÍŠIL, J. DOMBKOVÁ, R. LACH, W. GRELLMANN

New polypropylene particulate composite prepared using plasma treated CaCO₃ nanoparticles .... 52

Polymeric particulate composites with thermoplastics, especially a polypropylene (PP) matrix with mineral fillers, are of great practical importance due to the simple possibility of modifying mechanical properties and reducing the price/volume ratio of the resulting material. Fillers often do not directly face the matrix molecules in their bulk macroconformations. Both filler properties and interface properties have a great effect on the mechanical properties, primarily on stiffness and toughness, of the resulting composite material. Good final dispersion of the filler particles plays also very important role. To reach the best adhesion and distribution of the particles, various procedures were carried out as particle activation. The system PP homopolymer and CaCO₃ filler was used in the presented study. The commercial available CaCO₃ nanoparticles are of tens nm dimension but they typically form much bigger agglomerates with the size up to 10 µm. The plasma treatment by ambient air operating surface discharge was used for the filler particle activation. Using this activated filler material, composites with well dispersed particles with agglomerates smaller than 100 nm were prepared, i. e. the real nanocomposite was created. The influence of morphology on mechanical properties was studied and compared with the commercially available system.

A. AMELI, C. PARK, P. PÖTSCHKE

Foam injection molding enhances the electrical conductivity of nanocomposites .................. 58

Incorporation of foaming technology into the injection molding process of polypropylene/carbon nanotube composites increases the electrical conductivity by more than six orders of magnitude while decreasing the density up to 30 %.

Chinaplas 2016: “Greenovation for a Smart Future” ................................................. 60

New books .................................................................................................................... 61

People in the news ........................................................................................................ 62

Events .......................................................................................................................... 63

Suppliers list ................................................................................................................ 64

Publication information & contacts ............................................................................. 66